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BRIEFS

SPINNER UNSPUN. Owners of certain Cessna 150 aircraft permitted to use autogas under an August 1982 Supplemental Type Certificate will no longer have to install a larger spinner on their aircraft in order to use automotive fuel. Early tests had indicated the larger spinner was required to provide adequate engine cooling when autogas was used. However, subsequent tests proved that the size of the spinner--or even the lack of one--had no effect on the cooling of an engine using autogas. See previous issue for details.

THE REAL MCCOY. Balloon operators are cautioned to use only approved balloon material for repairs and patches. Some envelope patches using "similar" materials have been found on balloons, and pilots are warned that these may have substandard porosity, heat resistance, ultraviolet light resistance, rip-stop characteristics, and strength compared to the original materials. Consult your balloon maintenance manual to determine the type of approved material.

LEFT HOLDING THE HANDLE. The cabin door of a Beech 200 King Air was closed for takeoff, and the door warning light showed "OFF." However, on climbout the "door unsecured" light illuminated, so the copilot went aft to check. As he took hold of the handle to see if the door was secure, the door opened into the slipstream and separated from the aircraft, leaving the handle in the startled pilot's hand. Lesson--door warning systems are not infallible. Always manually check door latches while on the ground.

WEATHER GOES ON. Increased funding has permitted continuation of the televised aviation weather program AM WEATHER, sponsored by FAA and industry. Broadcast at 0645 and 0845 weekdays on 250 public broadcasting stations, AM WEATHER provides in-depth explanations of weather systems significant to flight planning.

TOW CARE. A Mooney M20J pilot was surprised when the nosegear collasped as he turned onto the taxiway after landing normally. The cause for the mishap was eventually traced to careless towing of the airplane with a motorized tug at his last layover. A mechanic confirmed that during the tow the limits of the steerable nosegear (14° in this case) had been exceeded. Transiting pilots should observe persons handling their aircraft on the ground, unless their reliability has been confirmed.

Amateur Ferry Flying

Perils and perks of building time at another's expense

Editor's Note: *General aviation aircraft, both new and used, are frequently bought by pilots who reside many hundreds of miles from the aircraft's present location, and often the new owner finds it inconvenient to take the time needed to personally assume possession. The cost of having the aircraft professionally delivered may be avoided by having a pilot friend or acquaintance, who is long on desire to build up air time and short on cash, make the pick-up and delivery.*

Such "amateur" ferry flying is perfectly legal—when the pilot is properly qualified—and can work to everyone's advantage as long as the preflight planning and preparation is appropriate to the task. Problems arise when the task is undertaken with a casual or unrealistic attitude which ignores such factors as flight experience, familiarity with the aircraft and the terrain, and flight fatigue (especially when flying solo IFR or in poor weather). Beware also the pressure traps that arise from inflexible time frames, job obligations, or a desire to maintain an image of superior flying competence at all costs.

The files of the National Transportation Safety Board show that for the two-year period 1979 through 1980 airmen suffered 181 accidents in ferry flying. Virtually all the accidents occurred to non-professional ferry pilots. Thirty-one of these accidents were fatal. Mechanical failure and inadequate preflight preparation figured prominently as probable or contributing causes, but the great majority of the accidents were attributed to simple pilot errors which appear to be associated with flight fatigue—in other words, too little time and too much to do. Half of the fatal accidents show fatigue as a major cause or factor—

Itinerary of the Washington, DC/Decatur, TX/Wichita, KS/Washington, DC cross-country flight. Distance traveled: 2,900 miles by air, 160 by land. Quite a chore for a light single in four days.

fatigue from the actual flying time involved, from delays incurred en route, or from "hostile" conditions, like flying in hazardous weather, or ducking under clouds capping high mountainous terrain, in unpressurized aircraft.

A long weekend may suffice for ferrying small aircraft up to 500 miles, provided that weather and other factors are favorable, but it is too short a period to be locked into for any trip longer than that. The accompanying narrative is a factual account (with some details altered in respect to privacy) of a recent ferry flight which began on a bright June day as a joyride and ended as a near nightmare.

It sounded like a piece of cake—sort of. A local judge who kept his Cessna *Centurion* (a high-wing, turbo-charged six-seater) at the airport in Washington, DC where I fly had sold the plane to a colleague in Decatur, TX (about 50 miles northwest of Dallas) and had ordered a new Beech *Bonanza* from the factory in Wichita, KS. But his docket was too full for him to leave town. So out of the blue he called me on Monday and asked if I'd like to do some flying at his expense. Seems he remembered me as a former law student and a fellow member of the Lawyer Pilots Club. How would I like to ferry his *Centurion* to its new owner in Decatur, then hop up to Wichita commercial, get a factory checkout in his new *Bonanza* and fly it back to Washington? Take my time, bring a friend, send him all the bills, just get back before noon on Sunday, so he could have a few hours with his new acquisition before the next week's burden of judicial responsibilities set in. Like to think it over?

I took about 20 seconds. How often did I get an offer to build time toward my commercial certificate at some one else's expense? My own calendar at the office was pretty light towards the end of the week so I was confident I could get away Wednesday afternoon, fly a few pleasant hours until dark, park overnight in a plush hotel, ditto Thursday night in Dallas, spend Friday delivering one plane and getting checked out in a brand new number, and fly home on Saturday. That gave me a good half day's leeway to accommodate the unexpected. I hustled around to the judge's chambers, where he gave me the keys, the necessary transfer papers, and a gentle but firm reminder..."Sunday noon, no later, please."

As I had never flown west of the Appalachians I indulged myself in a whole sheaf of new sectionals and low altitude charts (on the judge's tab, of course) and picked out the best routes. I'd flown five or six hours in the Club's venerable *Centurion*, so I could hardly wait to get my hands on the judge's 1981 mint condition model. I took my travel case to the office with me on Wednesday and tried to keep my mind on legal work. The friend I had invited to fly with me called at noon and had to beg out, but that didn't really bother me, not with an autopilot and all those avionic goodies on board, including weather radar—in color, if you please—and me with a recent instrument ticket. I didn't bother calling anyone else.

Wednesday, 1830 hours. Nowheresville. An impromptu all-hands meeting called at four p.m. dawdled forever and just ended. Hardly worth rushing out to the airport now. Early to bed with the *Centurion* owner's manual in hand, and up with the birds. At least I'd be starting out fresh. Breakfast in Cincinnati, lunch in Memphis, and I might get pretty close to Dallas by nightfall.

Thursday, 0615 hours. Weather briefing showed thunderstorms forecast during the morning over the Ohio Valley. High pressure air mass from Canada expected to move them south by early afternoon, but I couldn't see myself waiting it out in a West Virginia bordertown, so I opted for the southern route and filed VFR as far as Atlanta. A 0645 liftoff, beating the traffic jam out of Washington National. Great day for flying. Engine purring like a cat, all systems go. Felt like racing the sun up into the sky, but remembered Icarus and maintained six thousand five hundred. Let "George" take over and relaxed.

Over Richmond, VA at 7:20 local and still in the clear, but the weather is beginning to look overcast up ahead. A check with Flight Watch informs me that the forecast for this route was amended ten minutes after my departure, and I would have to go IFR most of the way to Atlanta. Rotten luck! Ceiling expected at or below 1,000' and visibility less than three miles, occasional thunderstorms. Charlotte and Hickory in North Carolina were still VFR, so I called the Danville FSS and asked for a GAR slot out of either airport. Politely informed GAR slots are not given while airborne. I proposed landing at Danville where I would get the GAR then take off again. That was fine with Danville Radio. They put me down for the 1300Z slot.

I checked my ETA at Danville: 1249Z. Eleven minutes to plan an IFR route, call in my flight plan, and get the clearance in time for the reservation—a little tight, right. A check with Danville Radio indicated they would take my IFR flight plan in the air, and the clearance would be ready when I landed to pick up the GAR. Sigh of relief.

With the autopilot in charge I dug out my instrument charts, which were well in the bottom of my flight bag and had my first go at filing IFR en route. Felt like a one-armed paperhanger. Between watching the instruments and scanning for traffic, I had little time to study the low altitude chart and decide my routing. I scribbled my choice on a spare flight plan form and then radioed it to Danville: V-266 to Barretts Mountain, NC VOR, direct Hickory. Since I wouldn't have enough time for a face-to-face briefing at Danville, I would have to get a more thorough briefing over the phone on the ground at Hickory.

The 130-mile ride from Danville to Hickory was bumpy and pretty much in solid cloud the whole way, but with only occasional light rain. I kept updated on weather conditions at Hickory and opted for the NDB Runway 24 approach. I landed at Hickory in heavy rain and rushed into the terminal to call flight service.

After a lengthy phone consultation with Greensboro FSS in the noisy pilot's lounge, I learned that once in western Georgia I would be in VFR weather with only the possibility of local air mass storms throughout the south and west into Texas by late afternoon. I felt that with airborne radar I could pick my way around any local disturbances.

Thursday, 1000 EDT. With a GAR from Hickory I headed southwest for Atlanta by way of Spartanburg, NC; Electric City, NC; and Norcross, GA. An hour into this leg gave me clear skies and somewhat hazy visibility. I cancelled IFR and proceeded visually to Atlanta. Landed a little before one.

After lunch, I stopped off at the on-field FSS for a face-to-face briefing. The radar summary charts shows a brighter picture for the rest of the route—just some scattered storms in generally clear skies. Refreshed in body and spirit, I preflighted the *Centurion* after supervising the refueling. I was not planning on stopping again until Columbia, MS where I would top the tanks again. Dallas would be the final stop for the day.

Thursday, 1430 EDT. Atlanta. It was at the run-up line that the engine sounded a bit rough on the right mag check. I enriched the mixture a little (surmised I had leaned it too much for taxi) and rechecked. Smoother. As I was announcing to the tower that I was ready to take off, I suddenly remembered the engine had skipped a beat coming into Danville. I hadn't really paid that much attention to it since I was too busy with that IFR flight plan. Probably just my imagination. Off I went.

The flight to Columbia, about 350 nautical miles, was fairly uneventful, as the autopilot did all the real work. With the help of radar I deviated a few times to avoid some isolated storms, but that didn't keep me from arriving within a few minutes of my ETA.

Inside the blessedly air conditioned flight office at Columbia Marion County Airport I sat down to wait for my fuel bill to be processed. It must have been the quiet and the cool air, for a few minutes later the lineboy was shaking me awake and holding the receipt out for me to sign. Somewhat groggily I complied and then walked around a bit to try and clear my head.

I hadn't realized I was quite so tired; it was only a little after 5 p.m. Actually, it was after 6 p.m. my time, and I had been up and moving for more than 13 hours. Letting myself fall asleep was a definite mistake. Now, all I could think of was a hot dinner, cool motel room, and a soft bed. But that would have to wait until the mission was accomplished.

The sticky Mississippi summer heat was even harder to deal with after getting that air-conditioned siesta, but I trudged out to the *Centurion* and unenthusiastically pulled my sweaty body inside. Naturally, it didn't want to start. I finally got it going after some cursing and a great deal of perspiration. Just two and a half hours more, I told myself. All this will be behind you, and you'll be cooling off in the Big D.

I taxied to the run-up line and went through the pre-takeoff checklist. Left mag checked perfectly. Now, the right. What's that? Backfire!

My mouth went dry and I switched the ignition back to both, then to the left again without any problem. I adjusted the mixture and tried the right again. POP! POP! POP! I turned the ignition back to both and thought.

The right mag could be dead or dying. The left seemed okay. It was only 375 nautical miles to Dallas, and the second mag was a redundancy, anyway. But what if whatever is wrong with the right mag goes wrong with the left at a most inopportune time, or anytime over this unfamiliar countryside? The thought of having to monitor the terrain below me made me heave a weary sigh.

I called Columbia UNICOM and asked if there was a mechanic on duty. A woman responded that "Willie usually works until 6 or so," but she couldn't find out because he didn't have a telephone in his shop. The maintenance hangar was at the opposite end of the airport, so I taxied over to find out for myself.

Willie sauntered out to greet me when I shut down and asked, "What can I help ya'll with?" I explained the problem, mentioning the roughness at Atlanta and the skipped beat at Danville. "Could be a fouled plug. I'll have a look." He disappeared into the dark hangar and reappeared in a few minutes with an assortment of screwdrivers and socket wrenches stuffed in a hip pocket. Slowly, he undid the cowl fasteners and exposed the engine. After pulling and testing each plug and checking the wiring harness with methodical precision, he finally examined the right mag.

Hugging the coastline under an overcast and hoping to run out of clouds before having to detour seaward is a nerve-wracking experience, especially without water survival gear at hand.

Friday, 1100 CDT. Biloxi. That's right, Biloxi—B-I-L-O-X-I, Mississippi, as I told the judge when I called him to tell him that Willie and I had finally located a replacement magneto for the *Centurion* and how much it was going to cost him ($500 to $600 installed). His polished incredulity suggested that I had sabotaged the airplane just so I could go junketing around the steaming swamps of southern Mississippi in Willie's ancient rattletrap of a pickup. He finally agreed to pay for the installation and rang off after reminding me that I was due back by noon Sunday, and he preferred that I did not take any more side trips.

By 4:30 p.m. I was back in the airspace again, headed for Texas, with the worn-out magneto stowed in a flight bag as evidence (People's Exhibit No. 1, Your Honor). After takeoff, to save time, I programmed the RNAV waypoints for a direct flight to Dallas/Love Field: distance, 335 nautical miles. My enroute weather briefing indicated that again I could be facing isolated thunderstorms throughout western Mississippi and Louisiana all afternoon and early evening, but with the radar I was confident I could work my way between them and be in Dallas by 8:00 p.m. I had called the judge's friend in Decatur and told him so.

Friday, 1720 CDT. Clear skies and excellent visibility greeted me at altitude. I set the autopilot, watched for traffic, and took an occasional photograph of the picturesque scenery below. The first clouds showed up about 80 miles out of Columbia, when I was just north of Natchez, MS VORTAC and crossing over the Mississippi River. The 50-mile mode on the radar was painting some activity ahead. According to the chart, that would put it 30 to 50 miles north of Alexandria, LA. A check with Flight Watch revealed an unexpectedly severe line of storms stretching all across Louisiana and slowly moving southeast. However, according to the several-hours old summaries, there appeared to be sufficiently wide breaks in the line for me to scoot through, using the radar. Once out of Louisiana, it would be clear sailing.

I wasn't on a flight plan so I contacted Alexandria (LA) Approach, gave them my position, and asked for VFR flight following, which they granted and assigned me a transponder code. I asked for the latest radar sequence reports, and they gave me the same dated information I had received from Flight Watch, apologizing that their weather radar was down.

As I moved into central Louisiana, the cloud build-ups appeared more ominous on the radar and to my eyes. In hopes of slipping through a break further south (north, I could see, was out of the question), I asked Alexandria Approach Control to approve a course change, and they agreed. I flew south until I was well southeast of Alexandria then headed west again. My radar showed that the holes I had hoped would be there were non-existent. I turned further south only to find more storms ahead of me now. So I turned north and retraced my flight path back toward Alexandria and then tried west again—with the same luck. South again.

The sky seemed to clear a little as I neared the Gulf coast and was handed off to Lake Charles, LA Approach. I immediately queried them on conditions to the west. Again I heard the same old sequence reports I had heard an hour before from Alexandria and Flight Watch. By now I was getting nervous, with visions of storms surrounding me as I flew in ever-shrinking circles. My fun flight had become a grim, one-sided contest—me against the weather.

Lake Charles Approach suggested heading for the Gulf of Mexico then west along the coast, which was clear as far west as Beaumont, TX, the limit of their radar. However, they had no real-time weather reports beyond Beaumont.

I found an opening in the storm line and flew due south, tracking to the White Lake, LA VORTAC on the coast. Lake Charles passed me a PIREP from a *Baron* out of Beaumont: The coast south and west of Beaumont was clear all the way to Galveston, TX. I breathed a sigh of relief—for a moment.

All my circling and turning over Louisiana had burned a lot of fuel. I must have flown at least 400 nautical miles. It was now 8:30 p.m., getting dark, and I was so far south of my intended destination, I had almost forgot what it was. I was tired; I was hungry; my mind was getting fuzzy. I wanted this all to be over. Galveston sounded like *relief*, in capital letters. Somehow, I held on and made it to the airport for a fuel stop and another in a long line of weather briefings. *Clear sailing to Dallas if I left*

Over the checkerboard midwestern farmland fatigue caught up with the pilot.

immediately; some weather expected to move after midnight.

Great! After a black coffee and a crumbly vending machine sandwich, I took off for Dallas, the last 250 miles feeling like 250 lightyears.

At 11:05 p.m. and one day late, I finally landed at Love Field, treating the tower to the worst landing of my career. Found a hotel and collapsed on the bed. Did remember to phone the judge's friend. He was not perturbed at the lateness of the hour, merely gratified that his airplane (and I) were both all right. Could I meet him at Decatur with the plane at 8:00 a.m.? *Why not?*

Saturday morning at 8 a.m. I landed at Decatur after only a few hours of dream-interrupted sleep where huge cumulonimbus clouds kept chasing me over the edge of the earth. I flew the *Centurion*'s new owner back to Love Field where he engaged a flight instructor for a checkout. They dropped me off at DFW so I could catch my airliner to Wichita.

Saturday, 1000. On board the 727 to Wichita I checked my schedules and did some planning. I would be noon by the time I reached the Beech factory. That would give me a couple of hours' time to check out, then fly east until dark. I could conceivably get the Bonanza back to the judge by the middle of the day Sunday, but it looked more like midafternoon. What the heck? Let him sue me. I was doing my best.

Well, of course, the plane was late getting into Wichita, and my growing tension turned the expected one-hour checkout into two. The chief pilot simply would not release the aircraft to me until he was satisfied I could fly it safely. After he finally signed me off, and I headed east, with the Pilot Operating Handbook open on the right seat, I discovered that the turn-and-bank indicator was not working properly. Oh well, I didn't want to go IFR anyway. Let's just hope the weather cooperates.

Three hundred miles and two hours later, as I was nearing St. Louis, MO, I was having trouble staying awake. It was only 6:30 p.m. and bright daylight, but when I found myself being reminded by a controller at St. Charles County Airport that the gear should be down before I landed, I knew it was time to stop.

Sunday, 0800. Sleep refreshed me somewhat, but arriving early at the airport I found it socked in—visibility 1/2 mile in fog, sky partially obscured. And me with a defective instrument. What to do? If I called the judge and told him I had left Wichita with a known deficiency he'd either refuse to believe me or have me jailed—or both. And he might be right.

Going on the FBO's assurance that "this stuff usually burns off by 10," I waited—and waited, visualizing the judge pacing up and down in the general aviation pilot lounge in Washington. I couldn't go near the phone. Finally, by 2 p.m., I had my three miles and was off.

Sunday, 1830. On the ground at Washington National, a beaten woman. If I didn't see another airplane for at least three years, it would be too soon. "Give me your receipts on Monday," read the terse note the judge had left for me. Between the lines I read, "See you in court some fine day, my young friend!"

Sleep eluded me that night until I had reviewed all my mistakes—and there had been quite a few:

- I had not thoroughly studied the weather in the beginning because I was too eager to get started. (By waiting a few hours on Thursday morning I could have flown the nor'hern route and missed all the bad weather which was waiting for me in the south.
- I had embarked on a long crosscountry in an aircraft I had not personally checked out in.
- I had not heeded the early warnings the airplane engine was giving me. (A magneto repair in Atlanta would have taken much less time.)
- I had flown without sufficient food or rest. (I AM NOT SUPER PILOT—yet.)
- I had flown a hurried 2,900-trip with limited long-distance experience and without someone to share the workload.
- I had subordinated common sense to a boogey-man anxiety about the judge.
- Finally—and foremost—I had locked myself into a time frame that was beyond my control.

Any one of those errors has killed pilots, but I had somehow managed to defeat my own unwitting best efforts toward that end. On the plus side, although I had frequently lost sight of good judgement for the sake of the "mission," I had managed to say "No" when it counted. That meant I had some redeeming qualities as a pilot.

And I had lived to fly again another day. ■

Even with full instrumentation, IFR flying can be fatiguing without a copilot.

Whistle Blowing For Airmen

The importance of pilot-generated comments on conditions in the airspace. . .

We learn from experience.

Sometimes, however, we would like to be able to learn without having to pay the piper, i.e., get stopped for speeding and warned, without getting the traffic ticket; overdraw our checkbook without actually bouncing a check; or bust a minimum and scare ourselves without having an aircraft accident. Aircraft are often quite forgiving, but what about the FAA inspector, when he learned that a rule has been broken? Doesn't he have to go by the book?

Many pilots emerge from potentially hazardous situations with a desire to warn others of the hazard, but are concerned about revealing their own involvement, lest it lead to enforcement action by FAA. For example, a pilot may experience several near collisions in a traffic pattern at a given airport without understanding why. He may be reluctant to query the tower for fear of being told that he has done something wrong. It is obvious to him that a change needs to be made; if the hazard is not reported whatever is amiss could go on uncorrected until someone gets hurt. Obviously, an anonymous reporting system is the answer to such pilot fears.

The formal technique for an anonymous reporting system which protects conscientious pilots from enforcement action was first worked out in April of 1976 when FAA, in collaboration with the National Aeronautics and Space Administration, established the Aviation Safety Reporting System (ASRS). The space agency was charged with collecting and "de-identifying" unsafe condition reports before passing them on to FAA for study and possible corrective action.

Contrary to fact, ASRS has been thought of by many in the general aviation community as

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IDENTIFICATION STRIP: ***Please fill in all blanks. This section will be returned to you promptly; no record will be kept.***

TELEPHONE NUMBERS where we may reach you for further details of this occurrence:

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AREA ___ NO. _____ HOURS _____

TYPE OF OCCURRENCE/INCIDENT: _____

DATE OF OCCURRENCE _____

TIME *(local, 24-hr. clock)* _____

NAME _____

ADDRESS _____

(This space reserved for NASA time receipt stamp)

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Please fill in appropriate spaces and circle or check all terms which apply to this occurrence or incident.

1. Location: *(Geographic (including State), airport, runway, ATC facility and sector, navigation aid reference, etc.)*

2. Type of operation:

SCHEDULED AIR CARRIER	SUPPLEMENTAL CARRIER	CORPORATE AVIATION	MILITARY ARMY
DOMESTIC OPERATION	CHARTER OPERATION	PERSONAL BUSINESS	NAVY/CG/MC
INTERNATIONAL OPN	UTILITY OPERATION	PLEASURE FLIGHT	AIR FORCE
AIR TAXI	AGRICULTURAL OPN	TRAINING FLIGHT	GOVERNMENT

3. Type of aircraft:

FIXED WING, LOW	RETRACTABLE GEAR	RECIPROCATING	GROSS WT <2500	25,000-50,000
HIGH WING	CONST. SPEED PROP	TURBOPROP	2500-5000	50,000-100,000
ROTARY WING	FLAPS	TURBOJET	5000-12,500	100,000-300,000
NO. OF SEATS	NO. OF ENGINES	WIDE BODY JET	12,500-25,000	OVER 300,000

4. Second aircraft TYPE: *(if two aircraft involved)*

5. Reported by: PILOT CREWMEMBER CONTROLLER OTHER *(specify)*
If pilot: TOTAL HOURS: HRS. LAST 90 DAYS:

6. Light conditions: DAWN DAYLIGHT DUSK NIGHT

7. Altitude: FEET MSL.

8. Flight plan: IFR VFR DVFR SVFR NONE

9. Flight conditions: VFR IFR

10. Flight phase: PREFLIGHT TAXI TAKEOFF CLIMB CRUISE DESCENT HOLDING TRAFFIC PATTERN APPROACH LANDING MISSED APPROACH

11. Airspace: POSITIVE CONTROL AREA (PCA) TERMINAL CONTROL AREA (TCA) ON AIRWAYS AIRPORT TRAFFIC AREA UNCONTROLLED AIRSPACE OTHER CONTROLLED AIRSPACE

12. Air Traffic Control: GROUND TOWER DEPARTURE CENTER APPROACH FSS NONE

13. Weather factors: RESTRICTED VISIBILITY TURBULENCE THUNDERSTORM AIRCRAFT ICING CROSSWIND PRECIPITATION NONE OTHER *(specify)*

14. *(Circle all which you believe apply to this occurrence)*
AIRPORT AIR TRAFFIC CONTROL AIR NAVIGATION FACILITY AIRCRAFT FLIGHT CREW AERONAUTICAL PUBLICATION/CHARTS OTHER *(specify below)*

15. NARRATIVE DESCRIPTION: *Please describe the occurrence as clearly and precisely as possible. Include information on: what happened . . . how was the problem discovered . . . what actions were taken . . . was evasive action required . . . what factors contributed to the situation . . . why do you believe the situation occurred . . . your suggestions as to how to prevent a recurrence.*
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Continue on other side.

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15. **NARRATIVE DESCRIPTION (continued):** *(Use additional sheets if necessary)*

Fold as indicated, fasten with staple or tape, and mail. Thank you for your cooperation.

CALLBACK

For pilots interested in monthly feedback from ASRS reports, NASA publishes a one-page publication entitled *Callback* with excerpts from selected ASRS reports and comments. To get on the *Callback* free mailing list, write to Mr. Bill Reynard, ASRS Office, P. O. Box 189, NASA, Ames Research Center, Moffett, CA, 94035.

the "airline pilots reporting system." Actually, ASRS is open to and encourages any participant in flight operations to report incidents. Controllers, airport operators, even passengers can use the anonymous reporting form.

Because pilots, for the most part, are the most physically active participants in flying, it is from them that the most useful information can be gleaned. That is also why certain safeguards were built in to ASRS to assure both anonymity and immunity. Some pilots are intimidated by control towers and shy away from voicing complaints unless absolutely certain there will be no retaliations.

To date reports submitted to FAA through NASA have resulted in over 700 ASRS Alerts, sent to the air traffic or flight standards facility involved for corrective action. This included changes in cockpit crew coordination procedures, changes to approach paths or takeoff profiles, and many more. ASRS reports have directly influenced two major regulatory changes in the past several years: Part 121.542(b) and (c) which requires only official business be discussed in airliner cockpits below 10,000 feet; and the recently enacted FAR Part 103, Operating Rules for Ultralights.

Even if an incident has resulted in a violation of FARs, and FAA learns of it from sources other than the ASRS, such as witness or newspaper accounts, the decision as to any enforcement action will take into consideration whether the pilot filed an ASRS report. That will usually be construed as a positive attitude, and in many cases preclude any action against a pilot's certificate—especially if the reporter has no previous violation history; the violation was clearly unintentional; and there was no criminal offense.

ASRS has averaged over 5,000 reports a year for the past six years. That has formed a considerable data base for learning from mistakes without—in most cases—paying any penalty. Through the quarterly reports issued by NASA, publicizing the categorized information, and through the changes in the airspace system the reports help bring about, ASRS reports are keeping the sky safer at a modest cost to airmen—essentially the effort it takes to fill out a form.

Have you been "sitting" on some information we should all know about? An updated advisory circular, containing the official reporting form, will soon be sent to pilots with a current medical.

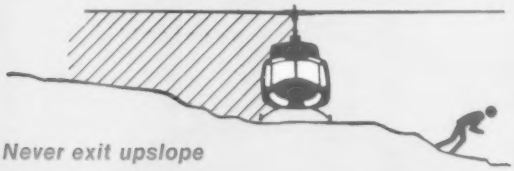
If you have a story to tell that won't keep, use the attached form to send it in. The postage is free!■

The Sting is in the Tail

Avoiding close encounters between helicopter rotors and people

Most people, tall or short, instinctively crouch somewhat when passing under the main rotor blades of a helicopter, even though the plane of the rotor arc may be well above their heads. It is a sensible precaution, as it helps keep debris stirred up by the rotor wash from being blown into the face, or hats blown off, or hairdos mussed up, etc., and of course on upsloping terrain, the normal rotor safety clearance margin may not exist. But ironically, almost all rotor strike accidents injuring people involve the *tail* rotor, not the main rotor blades. And ironically, also, most of the injured persons are not strangers to this type of aircraft, but are frequently passengers and occasionally even pilots.

Rotor strike accidents are not common, averaging only about two per year, but they are virtually traumatic to family, friends, or bystanders. What also hurts is that such accidents are regarded as *almost entirely preventable*, given rigid adherence to safety procedures. *Rigid* is the key word here. Typically, rotor strike accidents may occur when some unexpected distraction causes an individual to deviate from standard, established safety procedures.



Never exit upslope

Typical accident reports tell of the passenger who, just before liftoff, remembers a briefcase he left lying on a counter and dashes out of the helicopter to retrieve it, running through the unseen tail rotor arc. Or a boarding passenger who chases a wind-blown hat into the reach of the tail rotor. Or the parka-clad maintenance man whose peripheral vision is restricted by his fur hood. There is even an occasional aspect of the ridiculous, as when a wild boar on an island off the Florida coast, after being cornered by dogs pursued a passenger around his helicopter until the latter backed into the still moving blades.

More commonly, tail rotor accidents take place during the shut-down period after landing, when passengers mistake the continued rotor operation as a sign that the aircraft is about to depart without actually shutting down. (Most helicopter procedural recommendations call for running the engine and rotors at idle speed for about two minutes before shutting down, in order to dissipate heat evenly.) Unless flight or ground crew members are on hand to restrain them, passengers or visitors may enter the arc of the helicopter's turning rotors without waiting for the blades to stop.

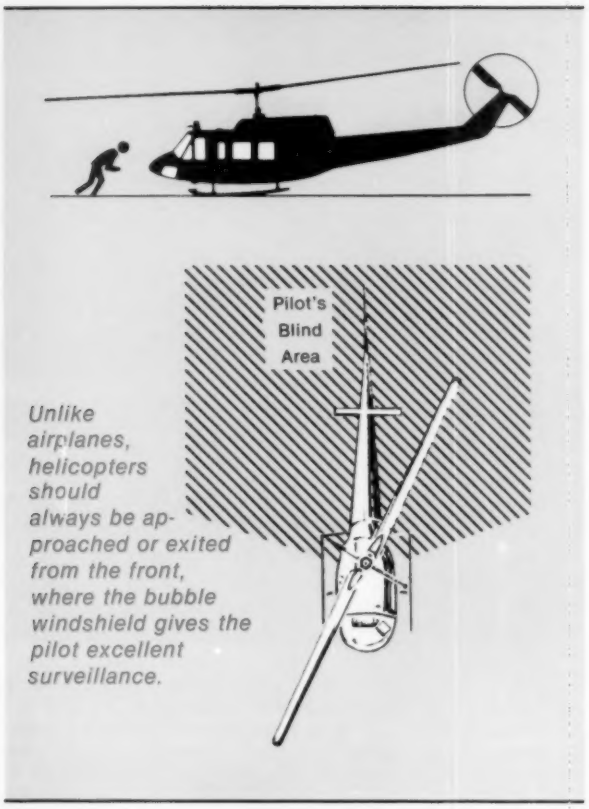
Crew members themselves are not immune from fateful distractions, as indicated in the following report from the files of the National Transportation Safety Board.

The aircraft was a Hughes 500, a four-place gas turbine helicopter used by a Chicago-based machinery manufacturer for on-site sales calls in southern Illinois. The occupants were the pilot and a sales representative (also a certificated rotorcraft pilot), who worked together regularly as a team. As a safety measure they had worked out a routine whereby immediately after landing for a sales call, while the pilot was monitoring the engine cool-down, the sales representative would quickly deplane and position himself behind the tail rotor to prevent any visitors from approaching too closely while the blades were still turning. It seemed to be an effective system.

On their third call one morning, at Ellisville, IL, the aircraft landed facing in a westerly direction, with the construction shack to the south, or on the left side. The sales representative stepped out of the righthand door, as usual, and walked toward the tail area. According to witnesses, he was observed to sidestep abruptly, move to his left and lower his head—apparently to avoid a blast of hot air from the turbine exhaust directly upwind. As he turned toward the waiting construction group he was facing the sun and he walked into the moving tail rotor arc. A small deviation from his normally safe routine was enough to cost him his life.

Tail rotor blades are dangerous for several unique reasons. The size, speed, and shape of the blades are such that under some light conditions the arc of the turning rotor is all but invisible—in contrast to that of the main blades, which may be both visible and audible. Victims step directly into the arc of the moving tail rotor while assuming they are walking around the stationary framework of the fuselage.

Habit is also a factor. Most persons who fly a great deal have been taught to avoid the front or propeller area of an airplane. We think of the tail section as the safe area and tend to approach all aircraft from the rear. In point of fact, it is generally best to approach helicopters from the front, making certain that the pilot sees you, and does not swing the tail around in your direction.



Unlike airplanes, helicopters should always be approached or exited from the front, where the bubble windshield gives the pilot excellent surveillance.

Safety rules for avoiding rotor strike accidents are simple and few, but unforgiving. They should be posted conspicuously and read aloud to all passengers before every flight. Some suggestions:

1) **NEVER** approach, depart from, or move closely around a helicopter without the express knowledge and approval of the pilot-in-command. This includes apparently unoccupied copters.

2) **NEVER** approach within the arc of the rotor blades unless you have certain knowledge that the engine has been shut down and the ignition is off. Assume all helicopters have a tail rotor, whether you see it or not.

3) **NEVER** approach, depart from, or move around a helicopter with your vision restricted by headgear, blowing dust, snow, sunglare, etc. (If temporarily blinded, sit down and wait for help; do not grope.)

Owners and operators of helicopters can also reduce the possibility of tail rotor accidents by keeping the blades freshly painted and free from dirt or grime. Federal Aviation Regulations (Parts 27 and 29) require that "Each tail rotor must be marked so that its disc is conspicuous under normal daylight ground conditions," but no specific color scheme is given. However, the most recent FAA study on the conspicuity of propellers and rotor systems suggests that a black and white, assymetrical pattern is most effective under varying conditions. All blades are required to be sensitively balanced, so much so that uneven painting by an unqualified person could result in dangerous vibrations.

NOTE: Various publications are available on the subject of helicopter safety. These include AC 91-32A, *Safety in and Around Helicopters*; and AC 91-42C, *Hazards of Rotating Propeller and Helicopter Rotor Blades*. Both are available free from the DOT Publications Section, M-443.1, Washington, DC, 20590. Also available is the booklet, "Be Alert and Live Around the Helicopter," free from Reed Stenhouse, 401 North Central Avenue, Glendale, CA, 91203. Report No. FAA-AM-78-29, *Conspicuity Assessment of Selected Propeller and Tail Rotor Paint Schemes*, is available to the public through the National Technical Information Service, Springfield, VA, 22161. The cost is $7.50 and order number is ADA-061-875. ■

Guard rail and effective paint job make the tail rotor on this Fairchild Hiller 1100 reasonably safe from human encroachment.

Short Cuts for Short IFR

The expanded Tower En Route Control service

The old adage, "It's an ill wind that blows nobody some good," is apparently just as true in aviation as anywhere else. Example: the air traffic controller strike of 1981, which caused certain temporary restrictions in air traffic services and airspace accessibility. But the strike also gave rise to certain innovations and changes in air traffic procedures which may have a long-lasting beneficial effect on flying.

For many years before the 1981 controller strike, FAA had provided a service called "Tower En Route Control" or "tower-to-tower service" for instrument flights between nearby cities as a means of reducing delays or to accommodate short flights. Clearances would be issued to pilots to fly between tower-controlled airports at altitudes that would keep them out of Center airspace. Instead they would be handed directly from one approach control jurisdiction to another adjacent to it. This service was not widely known or used in the days when IFR clearances were no problem and GAR slots were not yet a reality.

However, during the post-strike period shortages in air traffic control staffing led to temporary restrictions in the volume of instrument traffic which could be handled through the en route centers. After careful study tower en route service was expanded and published in January 1982 as an IFR reliever system. This led to a subsequent increase in IFR flight planning for relatively short trips, mostly by non-turbo jet aircraft entirely within approach control jurisdictions and below 10,000 feet MSL.

As of October 1982 the number of routes available in TEC—as it is called—had increased to over 1,900 routes between 177 approach control jurisdictions. Approach controls are radar service areas 70-80 miles in diameter surrounding busy terminals overlaid by Center airspace. Ceilings of approach control areas vary with need and density of traffic. (Where areas of approach control do not butt up against each other, Center airspace intervenes.) Pilots of *non*-turbojet aircraft on flights at or below 10,000 feet (the ceiling of TEC airspace) can file IFR and receive all necessary air traffic control separation services without ever having to communicate with Center controllers. Workload is reduced for the Centers and, in some cases, for the pilot as well since he does not have to be fitted in to high altitude en route traffic. The aircraft, of course, needs no special equipment other than what is normally required for instrument flight. Pilots may still find some delays at busy terminals that are still suffering from staff shortages, but this situation should ease as staff rebuilding takes effect.

The accompanying chart (overleaf) shows the terminal areas paired in the TEC service. Specific routing and NAVAID fixes as well as a detailed explanation of the routes are provided in the *Airport/Facility Directory*, usually available for consultation at most FBO's or by subscription from NOAA.

Flight service stations will also provide information on TEC routing and, in fact, are encouraged to suggest TEC to IFR pilots. Instrument flights plans are filed with flight service the same as normal but with TEC routing given and the initials "TEC" in the "remarks" section. Clearances are obtained in the usual manner—from ground control or clearance delivery, as appropriate. TEC routes follow existing airways and use established NAVAIDs.

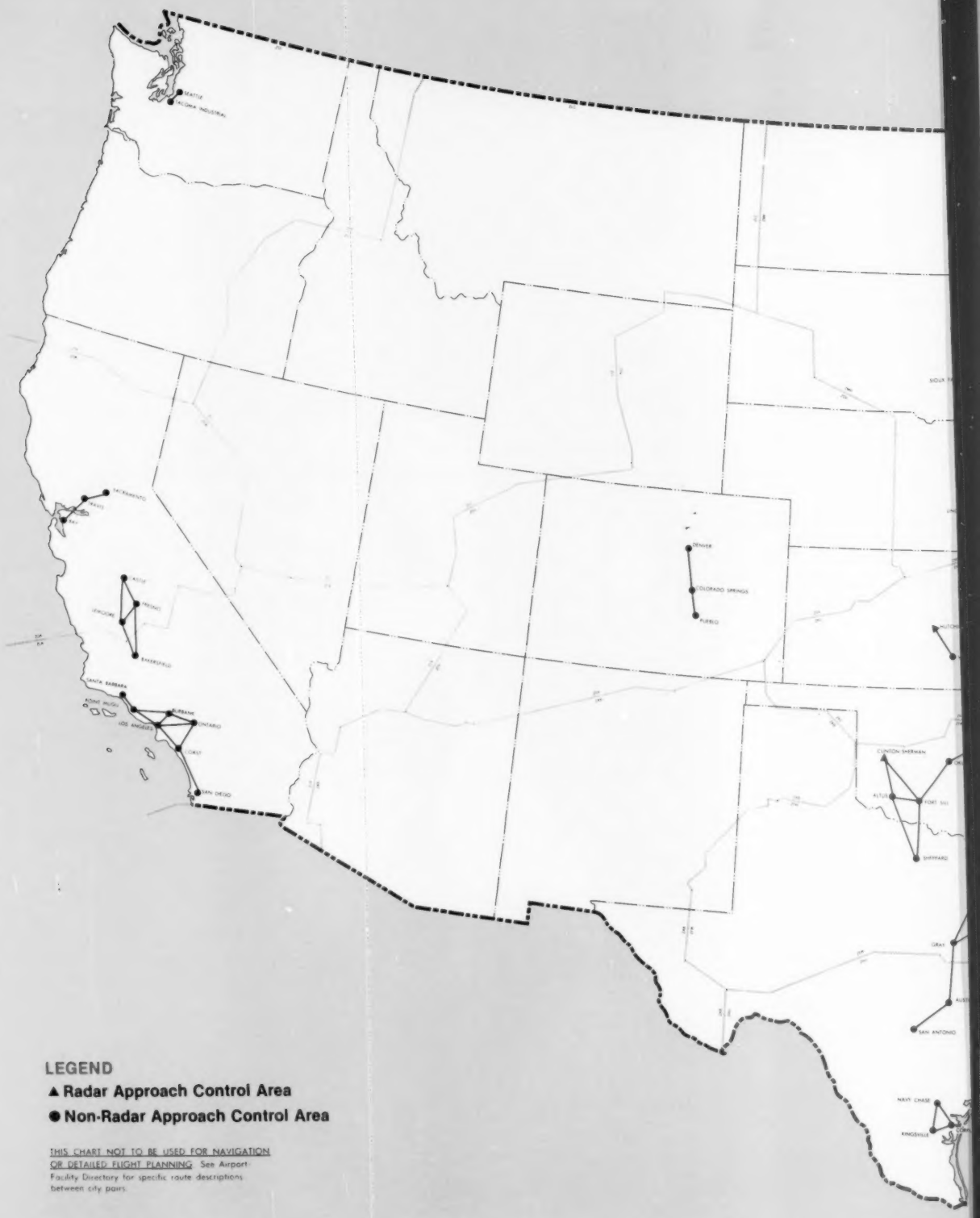
Pilots can even file TEC and complete their flights to satellite airports within the approach control jurisdiction. Most routes can be flown in either direction, and there may be several routes between the same terminal areas, allowing more pilots in the system and permitting them a choice of routing, depending on traffic density, terrain, and aircraft performance limitations.

TEC service, however, is only in effect during the approach control facility's normal operating hours (some are part-time since the strike), and pilots should consult NOTAMs for this information before filing for the TEC route. If a facility is closed, of course, the hand-off to the tower or approach control cannot be made, and the responsibility for the airspace has reverted to the appropriate Center. This should be taken into account when flight planning. If weather permits, the pilot can always cancel IFR and proceed visually.

There are a few other considerations as well. If the pilot is bound for an airport that requires a landing slot (e.g., one of the 21 busy airports designated after the strike or other high density airports), he must obtain his reservation prior to departure under TEC. If the pilot's destination is for an airport that does not require a reservation to land, then he is merely handed from tower to departure control on takeoff, then to approach control and tower for landing.

In the 11 months since TEC has been expanded, it has accommodated thousands of flights that would otherwise have had to compete for limited access to enroute airspace. New routes are progressively being evaluated and added to the service, and changes are updated in the *Airport/Facility Directory*, which is re-issued every 56 days.

Just a reminder—TEC is designed for *short* flights between two or more adjacent approach control jurisdictions. Any IFR flight longer than two hours that is normally flown at higher altitudes should be flown as a regular trip in Center airspace. For a lengthy flight, the repeated handoffs to approach control facilities in TEC could actually impose a greater workload on the system than a flight through the overlying Center airspace. ■



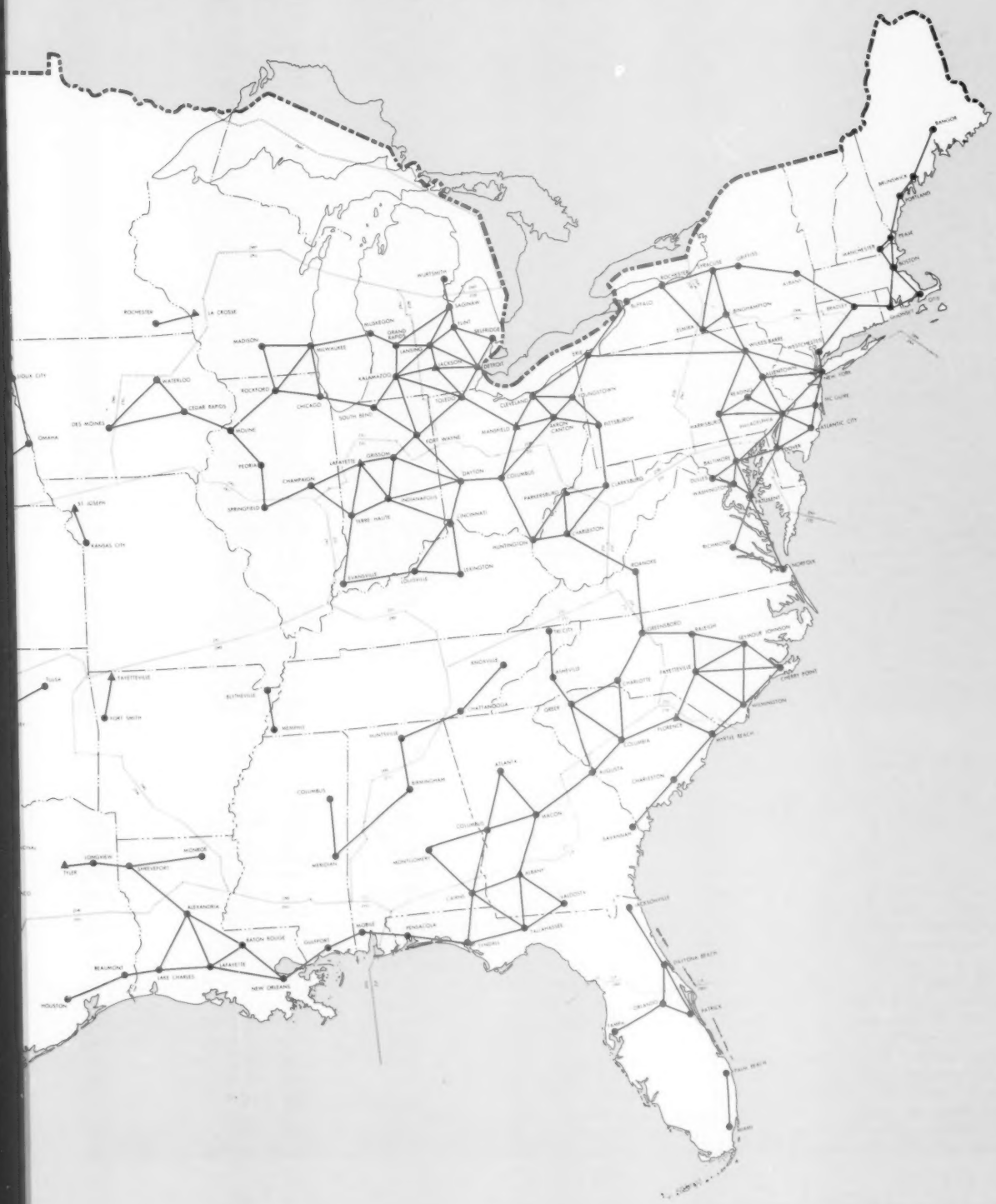
LEGEND

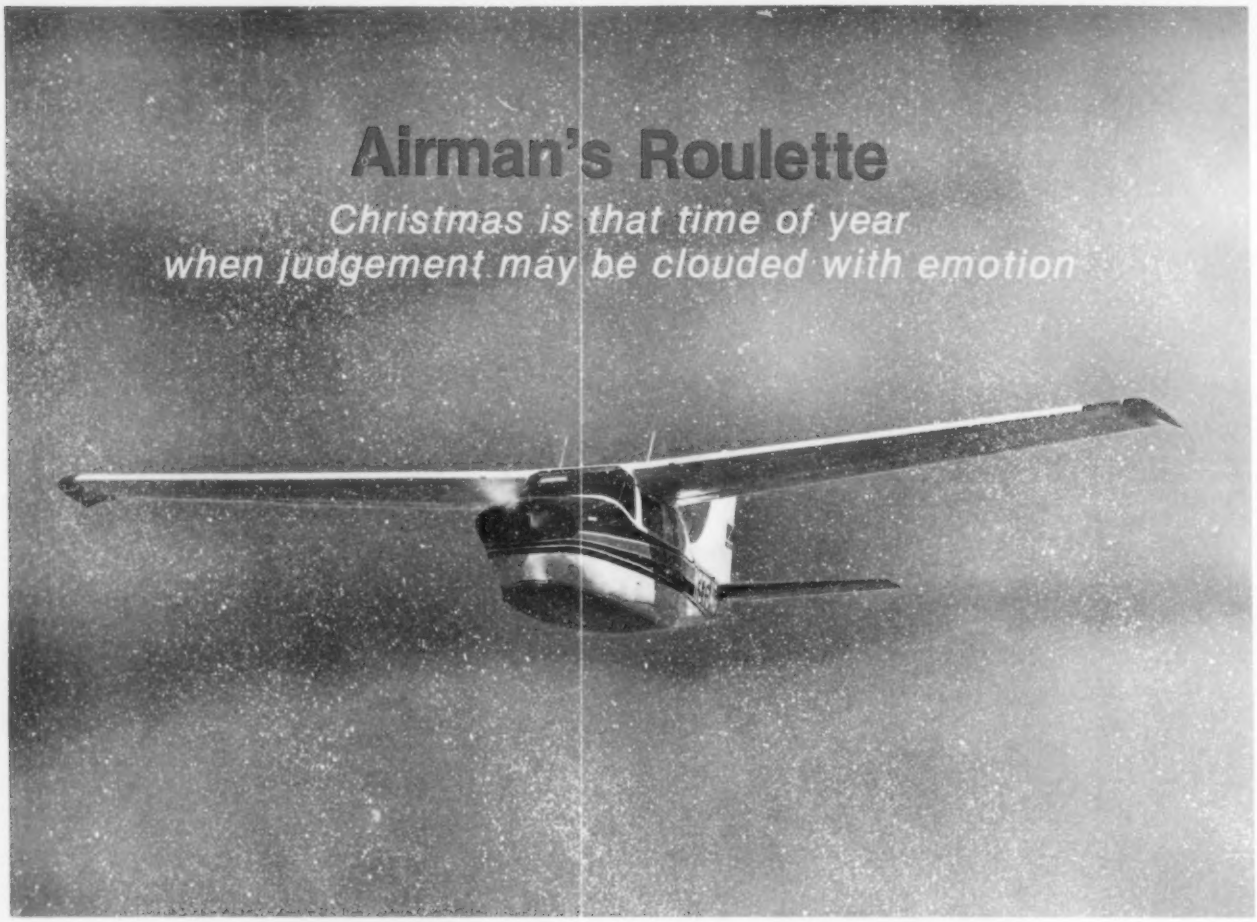
▲ Radar Approach Control Area

● Non-Radar Approach Control Area

THIS CHART NOT TO BE USED FOR NAVIGATION OR DETAILED FLIGHT PLANNING. See Airport Facility Directory for specific route descriptions between city pairs.

TOWER ENROUTE CONTROL (TEC)





Airman's Roulette

Christmas is that time of year when judgement may be clouded with emotion

The initial interview with the pilot and owner of *Bonanza* 778 Papa Delta took place on December 28, 1981 in the Fargo Receiving Hospital. He gave his age as 41; certificate, commercial with instrument rating; time in type, 180 hours; total PIC time, 680 hours. He said that he was "an insurance claims adjuster by vocation and a devotee of actuary statistics by avocation." He said that he doubted whether anyone in the whole county, or perhaps in the whole state of Wisconsin knew more than he did about accident statistics and probabilities—and that included cars, planes, boats, trains, anything that moved. He took pride in his rational judgment and still read his college Aristotle occasionally for pleasure. In his 15 years on the job he had seen so many mangled wrecks and torn bodies that he never ceased to wonder why so few people were able to exercise good judgment when it counted. And yet only five days earlier, on a dark wintry evening he had found himself at the controls of his aircraft, with his entire family on board, even their pet turtle, Hillary, trying to break out of a drizzly overcast he had penetrated with known icing, before he smashed into the ground. "All because of—what? Because it was Christmas. The best reason in the world for NOT getting everybody killed."

The pilot stated that the purpose of the flight was to attend a family gathering and Christmas celebration at the wheat ranch near Fargo where his wife's parents lived. The flight had originally been scheduled for December 20 but that date had been passed up because of a bad tractor accident near Wausau he had to investigate. It had taken him two days to clear up all the paperwork, so it was the day before Christmas Eve before they could leave Green Bay.

According to a statement provided by the Green Bay Flight Service Station a weather briefing for a flight to Fargo, ND was obtained by the pilot of *Bonanza* 778 PD on December 23 at 6:02 a.m. Eastern Wisconsin was reporting generally clear skies, but the central and western portions of the state and the adjoining portions of North and South Dakota were overcast with scattered rain and snow showers. At 5:47 a.m. Fargo had reported 400 feet overcast and visibility one and one half miles in light drizzle, with rain expected to continue throughout the day. The pilot's comment was, "Not great, but I can handle it."

The pilot said that he driven his station wagon to the parking area near the general aviation ramp at Austin-Straubel Airport at 7:30 a.m. on this morning and settled his family with all their Christmas presents in the airplane, then went upstairs to check on the weather again and file his flight plan with the FSS.

By this time the weather picture had changed, Fargo reporting freezing rain. Bonanza 778PD

was not equipped with de-icing gear. The pilot said that on principle he would not fly into known icing conditions, knowing how vulnerable a light aircraft was, regardless of equipment. He was prepared to cancel the flight, but considering that it was still early in the day and the icing report could have been an isolated event he decided to wait at the airport a couple of hours and check later reports. He sent his family into the main terminal for a second breakfast and busied himself tidying up the Bonanza and performing an intensive preflight check. He also studied the approach plates for Fargo and several nearby airports carefully.

At 10:00 a.m. he returned to the FSS and asked for the latest Fargo weather. The 9:53 Fargo observation showed a slight improvement: ceiling 500 feet overcast, visibility two miles, freezing drizzle. At noon the only change was a further improvement in the ceiling and visibility.

The pilot said that by this time his family was getting restless sitting around the airport and the girls had read all of the magazines they had brought along for the trip. He gathered everyone together and explained the situation. Because of the reported icing it was still No Go. He knew they were all tired of waiting but they were not going to fly in unsafe conditions. They had two options. They could take off and fly as far as Minneapolis/St. Paul and see if conditions had improved at Fargo. Sometimes icing dissipated as the day progressed and warmed up. But there was no guarantee; they might have to overnight en route, and hopefully continue on in the morning. Alternately they could return home, try to relax and see if the weather improved tomorrow. The forecast was not too promising. In either case they had to decide now, as it was at least a three hour flight and he did not intend to land after dark in these conditions. They clamored to go.

They all climbed back into the airplane. The pilot filed IFR via Wausau and Eau Claire on V-26, to Minneapolis/St. Paul on V-78, and onto Fargo via V-2 and the Darwin VOR. His clearance was delivered promptly and they were off the ground at 1:37 p.m.

Two and a half hours into the flight the pilot contacted Minneapolis Center and asked for the Fargo weather. The 3:54 Fargo observation showed indefinite ceiling 500, sky obscure, visibility three miles and fog. *Freezing drizzle had ended 15 minutes past the hour.*

The Bonanza was then approximately 70 miles out of Fargo, at an assigned cruise altitude of 8,000 feet. The pilot asked for approval to begin a slow descent toward Fargo, and received authorization from the Center.

Ten miles out of Fargo and still above the cloud tops at 3,80 feet *Bonanza* 778 PD was handed over to Fargo at Hector Field Approach Control and given the weather: five hundred overcast, visibility seven miles, temperature two six, dew point two six, wind three five zero at six. A PIREP received from a B-727 which had departed three minutes earlier reported moderate icing below three thousand.

Th pilot was informed by Approach Control to expect vectors for an ILS approach to runway 35. At this point he requested the weather for Grand Forks, 71 miles to the north. Grand Forks weather was essentially the same as Fargo, but without any indications of icing in the clouds. The pilot asked whether he wished to divert to Grand Forks or to continue the approach to runway 35. The time of this transmission was 5:46 p.m. local.

According to the pilot's statement, he elected to continue the approach because he considered that it would be pitch dark before he could reach Grand Forks, and that would make it

difficult or impossible for him to observe structural icing if such occurred during his landing there. He said that at the present time he could still see his wings clearly, with the help of his landing lights. It was his intention to discontinue the approach and return to Minneapolis if he experienced any ice buildup.

Bonanza 778 PD reported entering cloud tops at 3,500 feet. The pilot stated that during his descent through the clouds his cockpit windows became "frosted" and he had some difficulty seeing out to either side. He broke out of the clouds at 350 feet AGL, at which time, he said, the aircraft felt "somewhat heavy" and "there may have been streaks of ice along the wing." The runway was in sight, "about 15 degrees to the east," so he initiated a "very gradual" turn to his right, maintaining 110 knots airspeed.

He said that as soon as he felt the controls begin to "soften" he applied full power but was unable to prevent the stall. The right wing dropped down and the aircraft spiraled toward the ground. The pilot said that he remembered cutting the switches just before impact. The aircraft struck the ground approximately one half mile short of the runway.

Fortunately impact occurred in an open stubble field and there was no fire, although the right wing broke away from the fuselage. The two children were asleep in the back seat at the time of the crash, but were securely buckled in and received only bruises. Their mother suffered a mild concussion and shock. The pilot received a severe back strain and was hospitalized for three weeks. Investigators at the crash scene the following morning found some ice still adhering to the wing. There were also several long slabs of ice on the ground which apeared to fit the configuation of the leading edge of the wing. The ice was from one to two inches thick.

During his stay in hospital, prior to the interview, the pilot had reflected at length upon the events leading up to the accident, but was still at a loss to explain how he had come to commit himself to a situation that was clearly hazardous—not to mention illegal. He said that in fact while he was still under the influence of anesthetics he had difficulty believing in the reality of his experience—he kept thinking it was all some kind of nightmare.

He kept asking himself, *What had happened to his rational judgment? Sure, he had not wanted to disappoint everyone, especially the grandparents who set such great store by the annual Christmas get-together, with the horse-drawn sleigh rides and the barnyard visits and the rounds of neighborhood feasting and singing. Sure, it was great fun, but was fun worth risking lives for?*

Or was it the kids' faith in him as a "miracle worker" who always made their dreams come true, that he was unwilling to risk losing? Did he really have to be Super Dad, for them to love him? How would they feel about him if they knew, as he knew, that the "accident" was not simply an unfortunate, unavoidable mishap but the consequence of his accepting known risks—to their lives?

Following the interview and a consideration of all pertinent data, an enforcement procedure (for flying into known icing conditions without appropriate equipment) was taken against the pilot, resulting in a 60 day suspension of his pilot certificate.

The pilot did not contest the enforcement action. In fact he informed us that he had the suspension order framed, and later after he went back to work and resumed his appearances at safe pilot seminars he used the suspension as an object lesson on the subject of How to Rely on Good Judgment.

The lesson he had learned, he said, was that a pilot's judgment is reliable only if you weigh *all known risks of a proposed flight against the actual threat to human welfare or survival if the flight is not made.* If you weight the risks against a *desire for pleasure*, or image enhancement, financial gain, etc., the risks will be belittled out of all proportion to the truth. You will be playing an airman's version of Russian Roulette, with a heavy chamber. ■

Editor's note: The above accident case was based on a report in the files of the National Transportation Safety Board. Some of the details have been altered, to protect the privacy of those concerned.

Weather forecasts can change during the preparation for winter flight, when preheating and ice removal are needed. For longer flights, get a last-minute weather update from the FSS.

WHO'S FLYING THE AIRPLANE?

Close together as the student and instructor may sit in a light plane, there is occasionally room for miscommunications as to the maneuver being flown, the destination, or even as to who is flying the airplane. This can happen to anyone, even when the trainee is an experienced pilot, although it is most likely to happen when the student/instructor relationship is not of longstanding.

At Missoula, MT, recently a business pilot, holding a commercial certificate, with single, multi-engine and instrument rating, was taking instruction in a *Cherokee* for the purpose of obtaining an instructor's certificate. After leaving the airport the student was told to simulate a forced landing, following engine failure. Power was to be restored and the aircraft recovered at an altitude of 300 feet above the ground.

A suitable landing area in a meadow was selected and a standard approach was flown, but the instructor pilot sensed that the controls were not coordinated properly while making the turn onto final, resulting in excess altitude loss. He explained his point and applied additional aileron control. At this juncture his student relinquished control of the airplane, assuming his instructor had taken over. The airplane drifted within 50 feet of the ground before it became apparent that no one was flying. At this stage the instructor applied full power and attempted to gain flying speed, but was unable to counter the sink rate. The propeller and nose gear contacted with the ground and the airplane flipped over three times before coming to rest on its back. The instructor received serious head injuries, but later recovered. The student was not seriously hurt.

During the investigation the student stated it was his understanding that when an instructor made flight course corrections he was in control of the aircraft, and remained so until he said otherwise. The instructor stated it was his understanding he had not actually taken control, but had merely assisted the student.

Normally the instructor will make it unmistakably clear as to who has the controls, and will take over command of the aircraft before a hazardous (non-recoverable) situation develops. But the student should never hesitate to speak up if he has any doubt. The extent to which a flight problem will be allowed to develop before the instructor takes over is a matter of individual judgment, and is influenced by the proficiency status of the student.

Talk is cheaper than bandages. ■

Power-Off Approaches

Key turning points on base leg and final

Power-off turns in the landing pattern are executed less frequently now than they were in the days when airport traffic was usually light and most planes enjoyed a fairly shallow descent angle without power. However, many conscientious pilots still make it a point to find airports or terrain where there is an opportunity to practice landing without power. It is not a difficult maneuver, but if many years elapse between the time you last tried it and the day when engine failure in flight allows you only one pass at an unfamiliar runway, or simply a stretch of rural countryside, you may be surprised at how much you have forgotten.

The type of deadstick landing generally recommended and practiced is the 180° approach—similar to the downwind/base leg/final approach sequence of most airport traffic patterns. This is partly because it is the kind of approach you are used to making, but also because it gives you a chance to look over the landing area you have selected, adjust flaps, crank down gear, observe the wind, and spot any obstacles to be avoided; while maneuvering your aircraft down to the landing at a desirable airspeed and attitude. A straight-in approach gives you much less of an opportunity to understand what the wind is doing or to see what hazards to landing lie in the field you have selected—such as ditches, bogs, fences, livestock, etc.

Assuming you have enough altitude, the 180° approach is preferable, but it too has certain problems. The two 90° turning points have to be selected with a fair degree of accuracy, in relationship to wind conditions and the glide ratio of your aircraft. Otherwise, without power you may have to land short, or overshoot, or lose control while attempting to avoid either.

Although some pilots fly the base leg as a long continuous turn, FAA training manuals recommend two distinct 90° turns with a wings level flight in between. Levelling the wings gives the pilot the best visibility from the cockpit, allows him to minimize wind drift, and to check accurately on his track.

Strictly speaking, these turns may be described as *90° changes in direction of track.* With any appreciable wind, turning from the downwind course onto a perpendicular base course will require a turn somewhat greater than 90°, culminating in an appropriate crab angle. The turn itself is initiated with a bank steep enough to limit downwind drift. Similarly, the turn from base onto final will be somewhat less than 90°, as it will start from the crab into the wind. Rolling out of the turns smoothly on course will minimize altitude loss, as well as wind drift—which can be very helpful in assuring arrival at the desired touchdown point in good shape, without power.

Selection of the downwind turning point, sometimes called the Downwind Key Point, is critical. With power, you normally have little trouble entering on the downwind leg at the correct altitude, usually between 800′ and 1,000′ for light aircraft, and holding that altitude until you reach a point opposite the final approach segment. But without power you are *descending* on the downwind leg, which means that *you must establish this key point by reference to the ground long before you reach it*—in order to set up a glide path that will bring you to the point at the proper altitude. At the same time, with a medium to strong wind, you may want to

consider shortening your base leg by positioning your downwind key turning point closer to the intended runway—in order to avoid losing too much altitude on base.

If you know the actual windspeed and direction from a ground station, good enough; otherwise you will have to make some quick estimates by observing wind effect on trees, bushes, dust, smoke, etc., as well as from your track over the ground as you fly downwind. So, it is a good idea to make your own wind observations, as a matter of habit, whenever you are flying a VFR approach, correlating what you see with the reported wind data.

Pitch angle, prior to the second turn, should be adjusted to maintain a constant airspeed, approximately 1.4V_{so} (1.4 times the power-off stall speed, gear and flaps down). Flaps may be partially lowered as you prepare to turn on base, but only if you are certain you can afford to sacrifice some altitude.

If you discover after turning that you are too low and too far out, no adjustment of flaps or pitch angle will improve the situation. In a real-life situation, this would be the time to select a closer landing site, however unattractive that choice may be, which you can be sure of reaching with the aircraft under control.

If this is a *practice* power-off approach, this would be the moment to initiate the go-around, reconsider the conditions, and relocate your key turning point. When the approach is flown satisfactorily and the turn to final accomplished within desired touchdown range, airspeed may be reduced to 1.3 V_{so} and full flaps lowered, as needed. Check ground speed first, to make sure you have your intended threshold well within range—raising the flaps will not effectively stretch your glide at this point.

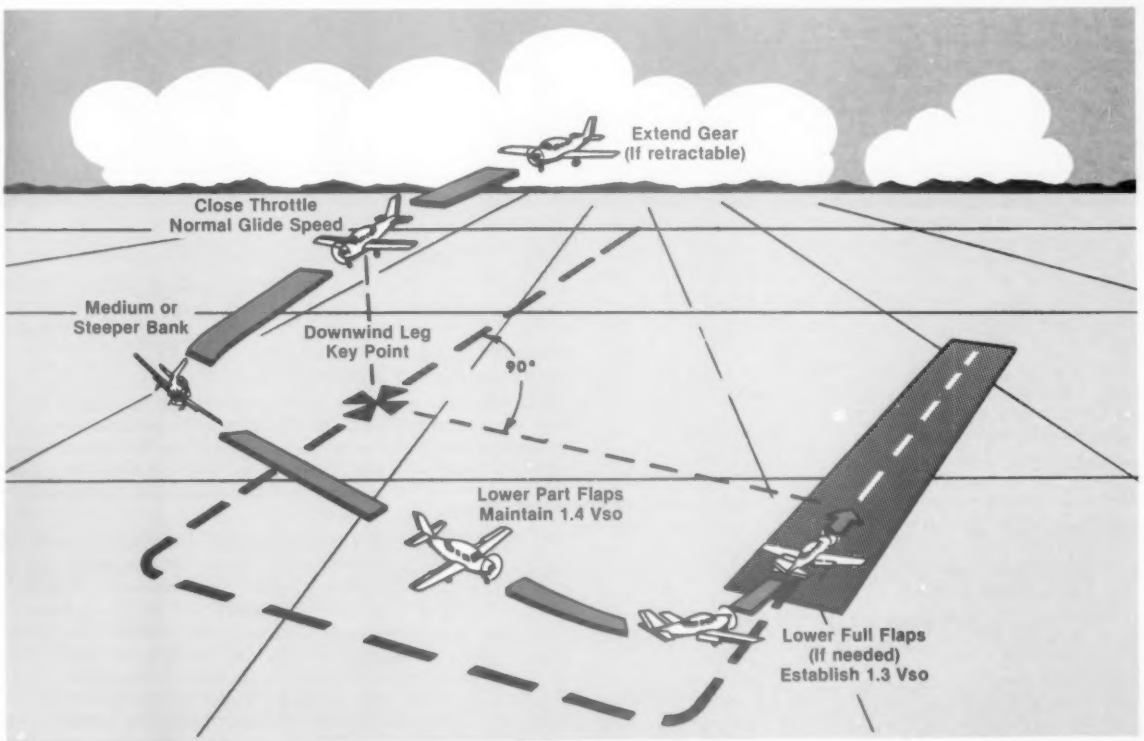
If you have enough altitude to start, you can get an even better idea of wind behavior and terrain aspects by executing a 360° turn over the intended landing area before you begin your approach. To practice this turn at an airport you would need the approval of any controlling facility on the ground.

The procedure is usually carried out by arriving over the threshold of the landing area at about 2,000′ above the ground, headed in the direction of landing. The throttle is closed to idle, and carburetor heat applied as directed. At a glidespeed of approximately 1.4 V_{so}, a continuous circling turn is performed, using turns steep enough to remain within the lateral boundaries of the pattern. Clear the engine occasionally. By the time you arrive back over your starting point you should have a pretty good idea of wind effect at all points of the compass and a bird's eye picture of the ground below.

From this point you fly to intercept the downwind leg at an altitude of approximately 1,000′ AGL and fly the standard 180° power-off approach already discussed, using two distinct 90° turns and a "box" pattern. At an airport be sure to announce your intentions on the radio and look out for traffic in the pattern. Making a *practice* power-off approach does not give you any special priority over other aircraft.

In a real emergency you cannot expect the wind to be blowing dutifully straight down your intended landing strip; conditions may be such that you have to settle for a wind dead abeam (90° crosswind). In these conditions, depending upon whether you are experiencing a tailwind or headwind on base, you would need to begin your turn to final earlier or later than usual, and roll out with a crab angle that will permit tracking straight toward touchdown.

Yes, it takes a little practice. ■



180° Power-Off Approach

Three Gentlemen from Albuquerque make the First Atlantic Crossing by Balloon

From left to right, Max Anderson, Ben Abruzzo, and Larry Newman.

Double Eagle II photos courtesy of Mr. Abruzzo

Ballooning, the first successful form of manned aircraft, has taken nearly 200 years to recapture public attention as a means of international travel. In 1977, just 195 years after the Montgolfier brothers' first balloon ascension in Paris, two Americans from Albuquerque lifted off from Marshfield, MA in a three-ton, nine story floating airship, the "Double Eagle," which like the Lone Eagle's monoplane before it was bound for Paris. There was something about the two contemporary balloonists that started people believing in a new age of heros.

Although the first balloon ascents in 1783 had caused some scientific and popular excitement, ballooning as a mode of travel had never been taken seriously, as no practical use could be envisaged. Basically a balloon airship was and remains a bag filled with a gas lighter than air (or hotter than the ambient air), with a net thrown over it attaching a basket underneath for a crew and provisions, including Champagne. The only controls are ballast, which can be dumped to make the balloon rise, and vents in the bag to release pressure and make it go down. The balloon goes strictly where the wind takes it, at wind speed. The supply of gas or ballast is not replaceable in flight (except for modern hot air balloons, with burners and portable fuel, suitable only for relatively short flights).

Although gas balloons (helium in the United States) need to be ballasted at night to prevent altitude loss, they can be re-energized by the return of sunlight, and theoretically are capable of traveling nonstop for thousands of miles—provided they are not destroyed or dashed to the surface by thunderstorm turbulence. To navigate a balloon successfully you must first be expert in meteorology, and it was lack of this qualification that brought so many early balloonists to a sad or mysterious end.

Following World War II the development of radar, long distance communications and satellite tracking of weather brought new impetus to the race to be first across the Atlantic in a balloon. Several dozen serious trans-Atlantic attempts were made, but none were successful and five persons lost their life.

The only flight that came close to succeeding was that of the "Silver Fox" which managed to traverse 2,700 miles from Massachusetts before splashing down in the sea, some 700 miles off the Portuguese coast. The pilot and balloon builder, Ed Yost, survived; and it was a magazine account of his adventures that fired up the imagination of Max Anderson and Ben Abruzzo in Albuquerque.

Although very different in temperament and appearance, these two friends shared in common a sense that life was a challenge, and to stay alive you had to be continuously facing that challenge in both a physical and mental plane. Both men had clawed their way to an upper rung in their respective professions—Anderson in mining, Abruzzo in real estate—and both had more millions than they know what to do with. Although Anderson was handicapped by loss of an eye in early manhood and Abruzzo suffered from a blood pressure problem that required daily medication, they continued to fly complex airplanes, compete in sports, race hot air balloons, sail yachts and travel extensively, while sustaining their families (each had four children) and their commercial empire. Now in their middle years, they were ripe for a new challenge when they read

about Yost and decided to capture the honor that had eluded him—first across the ocean in a balloon.

Within six months they had a balloon built for their needs—by Ed Yost himself. They also had the services of a top meteorologist, Bob Rice, who would plan their "trajectory", track their progress via communications satellite and radio them weather advisories (*climb, descend, hold your altitude*). They also had a veritable army of assistants, paid and unpaid, for working out the hundreds of minute details concerned with the late summer launch, including provisioning of the gondola, survival gear, protective clothing, foreign flags and overflight authorizations, etc., etc., etc.

According to meteorologist Bob Rice, the trick was to maintain the balloon within a "window" or area of relative bearing to favorable weather elements. "Double Eagle" would have to launch from its departure site at Marshfield, MA at a time when northly winds at low altitude would carry them to a point on the Canadian coastline, where they could ascend into an eastbound pressure ridge with strong favoring winds. Timing was crucial, because the ridge was preceded and followed by storm systems which could carry the balloon far away from their desired course.

Because of various "glitches", launch time had to be delayed by many hours, while their "window" narrowed ominously. They launched at the last acceptable moment: 8:16 p.m.EDT on September 9, 1977, amidst a flurry of last-minute decisions and misgivings, punctuated by emotional farewells from family, friends and onlookers.

The "Double Eagle" was in trouble almost from the start, in part because of Anderson and Abruzzo's inexperience in this type of flying but also, according to Bob Rice, because balloon meteorology still had much to learn. On the first night the craft almost smashed into Mt. Katahdin, the highest point in Maine, and then was sucked into a series of rotory air currents over New Brunswick that threatened alternately to fling the aeronauts into the sea or dash them to pieces on the rocky shore. Their close encounter with the surface cost them a section of the radio antenna and hundreds of pounds of ballast. Failure to climb early enough in the flight allowed them to drift into rain and snowstorms. Inability to communicate directly with Rice (they were obliged to rely on overflying air carriers of various nations) led to a misunderstanding about ballast remaining; and ultimately to a descent into a north Atlantic storm that carried them all the way up to Iceland and dumped them into the sea. They were rescued in the nick of time by an Air Force helicopter. Abruzzo suffered severe frostbite in one foot; Anderson emerged apparently none the worse for wear.

Neither man tolerated failure easily. In less than a year they were back on the New England coast with a new balloon, a new balloonist, and renewed enthusiasm. The third member of their crew, also based in Albuquerque, was Larry Newman, also a wealthy businessman, with an aviation background and a successful record of flying and manufacturing ultrlights—but a total stranger to gas balloons. Anderson and Abruzzo selected him essentially because they liked his style.

Their new balloon, the "Dougle Eagle II", stood 112 feet tall and had a diameter of 65 feet when filled with 160,000 cubic feet of helium. This 11-story monster was painted silver on top and black below, for maximum heating efficiency. The gondola, minute by comparison, was approximately 7½' x 15' and shaped like a twin-hulled catamaran, so that it was seaworthy if necessary. Larry Newman slung one of his ultralight gliders underneath the gondola as additional insurance.

The total lifting force needed was in the order of five tons, which included about 6,000 lbs. of ballast, portable oxygen tanks and masks, radio batteries and tranceivers, food and water for three for 30 days, and polar type sleeping bags and foul-weather gear. Everything was transported to the launch site, this time at Presque Isle in Maine, and the balloon was inflated on August 11, 1978.

Once again the weather "window" meteorologist Rice had carved out fo them required a night launch and once again there were emotional farewells as thousands of persons crowded the launch site. Lift off was at 8:42 p.m. This time ballasting was carried out promptly, and by midnight they were over a mile high in the sky. The next morning they sailed over Prince Edward Island in warm clear weather and ascended steadily to a cruise altitude of 15,000 feet.

On this trip the aeronauts carried Omega long range navigation equipment, as well as a radar transponder, a VHF and HF and short wave radio. But once again technical problems with the radios forced them to rely frequently on amateur "hams", or short wave operators, and on one occasion in mid Atlantic they found themselves communicating to Rice in Massachusetts via a ham in England.

On the fourth day out, when the Double Eagle II was about 1,000 miles off the Irish coast, their meteorologist became concerned about a new storm system that was forming east of Newfoundland and could drive the big balloon off course. He advised the aeronauts to ascend to 21,000 feet and they did so, donning oxygen masks and heavy clothing as the tmperature plummeted from 40° F. to 16° below zero.

Wednesday, the fifth day of the flight, was a day of crisis, tension, despair, and exultation. Dawn saw "Double Eagle II" at 23,500 feet over scattered clouds and headed straight for the Irish coast, some 400 miles away. Suddenly and quite inexplicably the balloon began a rapid twirling descent through an opening in the clouds. Tension in the gondola mounted as the three aeronauts, worn out from lack of sleep and the irritating effects of close confinement, high altitude, and bitter temperatures, disputed futilely as to the cause of the descent. Despite heavy off-ballasting, a sink rate of from 200 to 400 feet per minute continued. Radioed inquiries to their meteorologists in Bedford were of no help. Unless they dropped ballast, it seemed clear that they would soon find a watery grave, like the unhappy victims of Poe's "Descent Into a Maelstrom." But if they cut loose all ballast they would have no means of countering the normal nighttime sink, which meant going into the water in the dark. In either case, the thought of failing to complete the ocean crossing after all they had endured and worked for was a bitter pill to swallow.

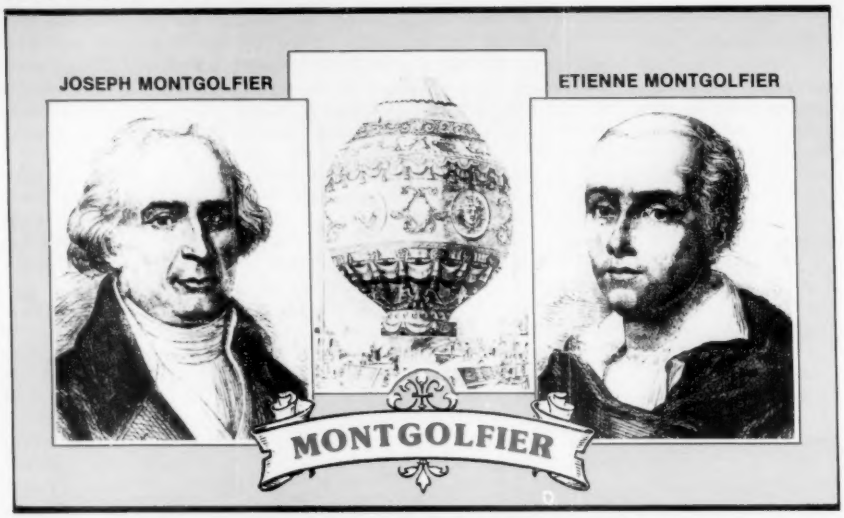
The only alternative was to dispose of every bit of cargo and equipment that was not absolutely needed, regardless of cost. Fantastically expensive TV cameras, radios, and navigation instruments went flying over the side, along with more mundane items such as cans of food, clothing, and a potty seat. At one point Max and Ben even talked about cutting the hand glider loose with Larry in it, despite a formidable distance to land.

As mysteriously as it had begun the descent stopped at 4,000 feet, and with continued stripping of the gondola in the afternoon sun, they rose back to 24,000 feet. At sunset the evening sink began, and another round of furious ballasting brought them back to equilibrium at 13,000. Suddenly they saw lights below, and a radar conroller at Shannon Airport informed them they were over Irish soil. They were in Europe! As they flew over England at 11,000 feet the next morning in clear weather, thousands of persons on the ground cheered them on. Over the English Channel a "reception committee" of light aircraft encircled them and waggled their wings.

On the sixth day, still headed for LeBourget Field near Paris, where Lindbergh had landed in 1927, the balloon began to settle toward the earth. The ballast was all gone by this time and in fact the crew had jettisoned everything they could lay their hands on, even Newman's glider, but it was not quite enough. At 7:49 p.m. the gondola touched down gently onto a grain field at Misery, some 60 miles northwest of Paris. They had been aloft for five days, 17 hours and six minutes. They had sailed farther than anyone before in a balloon, over 3,100 miles. And they had conquered the Atlantic as no one before had ever done it, and perhaps would never do again. The enthusiastic French called them "Those marvelous flying fools."

Max Anderson, Ben Abruzzo and Larry Newman emerged from the flight in excellent spirits but apparently all three suffered an incurable addiction to long distance ballooning. While Newman and Abruzzo sailed over the Pacific in "Double Eagle V," Anderson established a new trans-continental distance record and then set his sights on a round-the-world flight in his "Jules Verne" balloon. Despite some recent setbacks, he still expects to make it.

No one expects ballooning to become a form of commercial transportation but nevertheless these extraordinary flights have had their impact on aviation. A whole new store of meteorological information has been amassed, which undoubtedly will be used in the near future to improve flight safety in all kinds of weather. ■



FIRST 200 YEARS. It seems only yesterday, but it was 200 years ago, in 1783, that Frenchmen Joseph and Etienne Montgolfier wafted aloft their hot air balloon and accomplished the first official manned flight. A year-long celebration of the bicentennial of manned flight has been proclaimed by President Ronald Reagan. Monthly commemorations in 1983 will include an aerospace symposium at Baltimore Airport in March; an aviation oriented concert at the Kennedy Center in April; an art exhibit at the National Air and Space Museum and an international Balloon race in Los Angeles in May; an international balloon rally on the Mall in the Nation's Capital in July; and a special recognition at the annual Oshkosh fly-in in August. For further information on scheduled bicentennial events, contact Intersept, 1575 Eye Street, N.W., Washington, DC, 20005; (202) 289-5392. For word of the latest major ballooning achievements, see p. 20 of this issue, "First Atlantic Crossing in a Balloon."

CROSS-COUNTRY RULE CHANGE ON EXTENDED TRAINING FLIGHTS

Effective November 15, 1982 private and commercial students and their flight instructors now have more flexibility in planning the extended crosscountry flight required for certification. Under the change to FAR Part 61, private pilot applicants will still have to accomplish a crosscountry flight of 300 miles, with landings at a minimum of three points, but only one landing will have to be at least 100 nautical miles from the point of departure. Commercial long crosscountries now have no fixed minimum distance requirement. The flight must consist of at least three landings, with one landing not less than 250 nautical miles (150 in Hawaii) from the point of departure.

The change will enable flight instructors to send students on practical cross-country flights after duly considering the terrain, availability of NAVAIDs, complexity of terminal areas, local weather characteristics, etc. and reduce the likelihood of an accident.

For further information, contact Roger M. Baker, Jr., FAA Project Development Branch, AFO-850, 800 Independence Ave., S.W., Washington, DC, 20591; (202) 426-8150.

TCAS II TEST COMPLETED

FAA and Piedmont Airlines have completed a five-month flight test of the proposed Traffic Alert and Collision Avoidance System (TCAS) using two developmental models of TCAS on board two B-727 aircraft in regular service. TCAS amassed 928 hours of operational performance data during the test program.

The aircraft were configured as proposed in the FAA plans for TCAS development—with direction finding antenna; a control/display unit in the cockpit; and an instantaneous vertical speed indicator.

In flight, TCAS provided over 300 hundred traffic advisories and 32 resolution advisories. However, nearly half of the advisories involved aircraft that were on the ground and no threat to the test 727's. A suppression technique has been developed which will be incorporated in future tests to eliminate advisories involving aircraft on the ground.

With this modification, the number of advisories occurring is expected to be well within acceptable range.

COPIES OF NEW PART 103

Copies of FAR Part 103, "Operating Rules for Ultralights," are no longer available from AFO-820 as indicated in the September/October 1982 issue ("The Ultralight Solution"). Persons needing this information may contact Thomas Hook, FAA Office of Public Affairs, APA-430, 800 Independence Ave., S.W., Washington, DC, 20591 for a free copy (limited supply, include mailing label or self-addressed envelope.) Or order a subscription (which includes changes as they occur) from Superintendent of Documents, Government Printing Office, Washington, DC, 20402 at $32.00.

AVIATION WEATHER BAND

General aviation pilots in the Baltimore-Washington area have been participating in a six-week test of an aviation weather broadcast that would provide preliminary briefing information without requiring contact with a flight service station.

Aviation weather information was added to the 24-hour a day NOAA Weather Radio broadcast emanating from area NOAA transmitters in Manassas, VA and Baltimore, MD. (NWR provides local weather nationwide on selected frequences that can be received on relatively inexpensive "weather band" radios and a few commercial receivers.)

The 60- to 90-second aviation segments included reports and forecasts for cloud height and ceiling, visibility, and other more severe weather such as thunderstorms, hail, rain, and snow. Based upon information received over the weather band, pilots could decide whether conditions are conducive to safe flying—and if so, seek a detailed briefing from flight service. In periods of severe weather, the broadcasts could reduce the number of requests for initial weather briefings, thus freeing FSS telephone lines for IFR and other intensive briefings.

Pilots who used this test service are asked to send comments to FAA, 800 Independence Ave., S.W., Washington, DC, 20591, ATTN: AAT-360.

LASTEST AIRMAN PUBLICATIONS

Fire Protection

FAA has announced publication of a new fire protection and rescue manual by the International Fire Service Training Association. The manual provides information to airports and fire departments on aircraft firefighting and rescue. IFSTA Manual 206 may be purchased for $9.50 a copy from IFSTA, Fire Protection Publications, Oklahoma State University, Stillwater, OK, 74078.

Certified TSO Articles

A list of articles that are eligible by Technical Standard Order design approval for use on U.S. type-certificated aircraft can be found in AC 20-36M, "Index of Articles (Materials, Parts, Processes, and Applicances) Certified under the Technical Standard Order System." The AC can be purchased from U.S. Government Printing Office, Superintendent of Documents, Washington, DC, 20402. Write to them for the current price.

Designated Engineers

A list of engineers who are available for consulting purposes is included in AC 183.29-1Q, "Designated Engineering Representatives." The listed individuals are direct representatives of FAA and are privileged to approve engineering or flight test information.

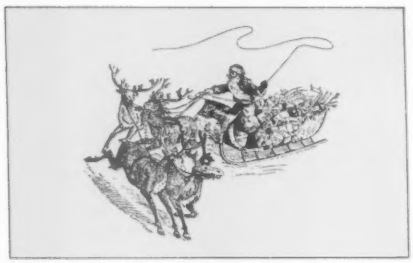
Airport Lighting

For a list of manufacturers qualified to supply airport lighting equipment, consult AC 150/5345-1H, "Approved Airport Lighting Equipment.

The above two items are free from DOT Publications Section, M-443.1, Washington, DC, 20590.

• "On the First Day of Xmas..."

I'm at a loss. What do I get my aviator spouse for Christmas? I've exhausted all the possibilities. We just don't have the room for 11 lords a leaping (what with all those darn elves running around), and I don't want to clean up after the turtle doves. Any suggestions?



Mrs. K. Kringle
Arctic Circle

Why don't you update your husband's avionics package with an inertial navigation system (since we deduce he is into global navigation) or replace Rudolph's rotating beacon? Top it off with a subscription to *FAA General Aviation News* to keep him updated on regulatory and operational changes that affect his flying, especially that low-level stuff. It could also help out a little with the turtle doves.

• Before or After Solo?

Some flight instructors at our flight school have different opinions about the following. We all know that a student pilot certificate must be endorsed before solo flight and that the student's logbook has to be endorsed as well. What we can't agree on is whether the logbook should be endorsed before or after the first solo flight. I say before because the student needs that endorsement to act as PIC. The others say it doesn't matter as long as it gets done. Could you straighten us out?

T. R. Barron
Boston, MA

According to FAR Part 61.87(d), a student pilot may not solo until both the student pilot certificate and the pilot logbook have been appropriately endorsed prior to the flight.

• Stretching the BFR

I received my private certificate on January 8, 1981, and I realize I am soon due for a Biennial Flight Review. But my instructor is booked solid until the end of January. May I continue to exercise the privileges of my certificate until he is scheduled with me on January 30th?

Jim Robertston
El Paso, TX

Negative. Part 61.57(a) states that no person may act as PIC of an aircraft unless "*...within the preceeding 24 months...*" he has passed a flight review (or a flight test for an additional rating or certificate) and had his logbook so endorsed. To go beyond the date of the last review would exceed 24 months. Any certificated instructor may accomplish the review.

• Airport Vicinity

Part 91.5(a)—Preflight Action—states that for "...a flight not in the vicinity of an airport..." certain information must be obtained by the pilot. What distance is implied by "not in the vicinity of an airport?"

Philip Aschinger
Culver, IN

As a matter of general practice anything less than 25 nautical miles is considered in the vicinity of an airport.

• The Late, Late News

I know it's an old familiar refrain, but can you tell me why the September/October 1982 issue of FAA General Aviation News *arrived so late?*

Jos. Brown
Los Angeles, CA

A railroad strike piled up third class mail (which we use to keep down costs). Some deliveries were delayed as much as three weeks. We regret the inconvenience.

To avoid any entanglements with Santa's express mail, we are launching this issue December 1.

• Record of VRS

Frequently I read accident reports which state, "No evidence that the pilot received a weather briefing." I use the Voice Response System (VRS) in the Washington, DC area to obtain most of my weather briefings. I usually fly over familiar routes that my friends or FBO know I use, but what can I do so that the FAA has a record that I received a weather briefing from VRS—just in case?

Name Withheld
Arlington, VA

There is no way to inform FAA directly that you obtained weather information from VRS, which FAA does not regard as a complete weather briefing. The VRS is currently on a test basis only. If you feel it has supplied all the information appropriate for a flight or to meet the requirements of 91.5(a), that would be your decision.

• 24-Hour Refresher

I have just completed an FAA-approved weekend flight instructor refresher clinic to renew my CFI ticket as required by FAR Part 61.197. As I sat through three straight days of eight-hour classes, I found myself wondering what was the rationale for the 24-hour requirement. Isn't there a better way?

Name withheld
Richmond, VA

The 24 hours of refresher ground or flight instruction is a time frame that has worked well in the clinics for discussing all necessary information. A refresher clinic, of course, is not the only way to renew a flight instructor certificate. Alternate methods include successful completion of a flight test will do; an instructional record showing competency—students successfully completing their courses; or completion of an oral test in combination with a satisfactory record as a company check pilot, chief flight instructor, PIC of a Part 121 aircraft, or other activity involving the regular evaluation of pilots.

• Wildlife Enforcement

On sectional charts one part states, "All aircraft are requested (my emphasis) to maintain a minimum of 2,000 feet above the terrain..." over national parks, wildlife areas, wilderness areas, primitive areas, etc. If I fly less than 2,000 feet above the terrain, am I in violation of FARs and can enforcement action be taken against me?

Richard Franklin
Denver, CO

If you do not adhere to the minimum safe altitude requirements of FAR 91.79, FAA can take enforcement action. If you make a non-emergency landing where it is not permitted, you could also face fines and imprisonment by the various authorities supervising these areas. If you are a hunter, be aware that a violation of the Airborne Hunting Act of the Department of the Interior, carries a $5,000 fine and/or one year imprisonment as well as aircraft seizure.

The areas you mention are listed in the *Airman's Information Manual* as noise sensitive areas where animal environmental balances could be seriously disturbed by aircraft flying lower than 2,000 AGL. The Forest Service asks for and usually receives pilot cooperation.

FAA GENERAL AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA GENERAL AVIATION NEWS, AFO-807, Washington, D.C. 20591.

• Overflying Ultralights

According to your airspace graphic on pp. 8-9 of the September/October 1982 issue ("The Ultralight Solution"), it appears that by flying at altitudes above 14,500' an ultralight could overfly a town, city, settlement, or open-air assembly of people. I thought Part 103 precludes this at any altitude.

Art Jones
Washington, DC

You are correct. The colored hatching over the symbol for a town, city, etc., should extend infinitely upwards.

INSTRUMENT CORNER

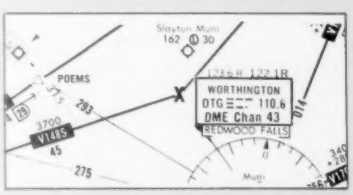
• X Marks the Spot

On the low altitude enroute charts an "X" on the airway indicates a "mileage breakdown" according to the legend. I have three questions that relate to this symbol.

1) *What is the minimum amount of turn in the airway which would require the use of an "X"?*
2) *Is the "X" always associated with a turn in the airway or does it appear in a straight airway?*
3) *Why not just make it an intersection rather than using the "X"?*

If possible, could you tell me the reference you used?

Corey J. Ferguson
Lawndale, CA



The "X" symbol is used for several purposes on the low altitude charts: to designate mileage from a fix to the point where an airway doglegs *any amount* or an alternate airway intersects; or to show when a change occurs in the minimum enroute altitude (MEA) where there is no reporting point. (The mileage numbers are on the segment of the airway preceeding the "X".) When an "X" is used for mileage breakdown it is only on an airway that turns; when it is used for an MEA change it can be on a straight airway.

As for your third question, the "X" is used instead of an intersection to show MEA change or a turn in the airway because the place where the airway turns may not meet the specifications for an intersection, e.g., 30° divergence of two radials. Or simply, an intersection may not be required at that point.

The reference used is the Interagency Air Cartographic Committee Specification Number 1. Any further questions should be directed to FAA's Cartographic Standards Branch, AAT-210, 800 Independence Ave., S.W., Washington, DC, 20591; (202) 426-3758.

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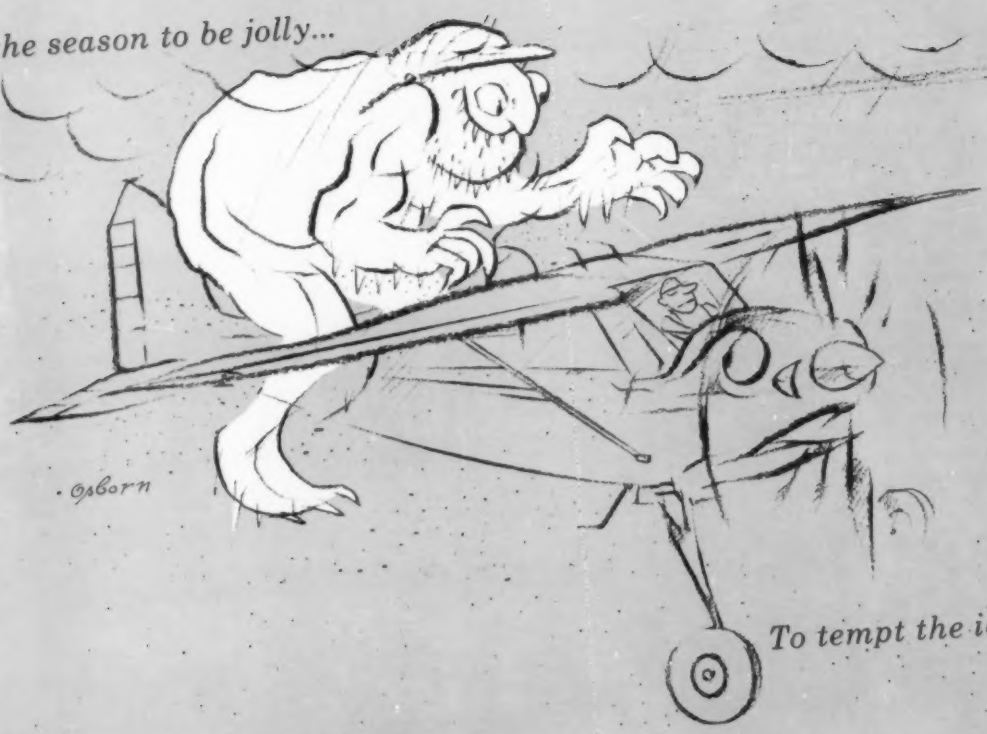
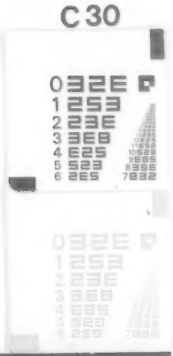
'Tis the season to be jolly...



To tempt the iceman would be folly.

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